City of Cottonwood (PWS ID2250013)
SOURCE WATER ASSESSMENT ADDENDUM

February 6, 2006

State of Idaho
Department of Environmental Quality

Executive Summary

Under the Safe Drinking Water Act Amendments of 1996, all states are required by the U.S. Environmental Protection Agency (EPA) to assess every source of public drinking water for its relative sensitivity to contaminants regulated by the Act. This document is an addendum to the report completed February 2002 and will focus specifically on Well #5. This assessment is based on a land use inventory of the designated source water assessment area and sensitivity factors associated with the well and aquifer characteristics.

This report, *Source Water Assessment Addendum for ID2250013, City of Cottonwood, Idaho*, describes the public drinking water system, the boundaries of the zones of water contribution, and the associated potential contaminant sources located within these boundaries. This assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. **The results should <u>not be</u> used as an absolute measure of risk and they should <u>not be</u> used to undermine public confidence in the water system.**

Final susceptibility scores are derived from equally weighing system construction scores, hydrologic sensitivity scores, and potential contaminant/land use scores. Therefore, a low rating in one or two categories coupled with a higher rating in other category results in a final rating of moderate, or high susceptibility. Potential Contaminants/Land Uses are divided into four categories, inorganic contaminants (IOCs, e.g. nitrates, arsenic), volatile organic contaminants (VOCs, e.g. petroleum products), synthetic organic contaminants (SOCs, e.g. pesticides), and microbial contaminants (e.g. bacteria). As different wells can be subject to various contamination settings, separate scores are given for each type of contaminant.

The Cottonwood Water Department drinking water system consists of four active wells. This report assesses Well #5. Well #2 W Big and Well #4 North were assessed in "Cottonwood Water Department (PWS 2250013) Source Water Assessment Final Report", and is available from DEQ upon request.

Well #5 was brought on line in the summer of 2003. In terms of overall susceptibility, Well #5 rated moderate susceptibility for IOCs, VOCs, SOCs, and microbial contaminants. Hydrologic sensitivity rated moderate susceptibility and system construction rated low susceptibility. Land rated moderate susceptibility for IOCs, VOCs, SOCs, and microbial bacteria.

No VOCs or SOCs have been detected in the well. Trace concentrations of the IOCs barium, fluoride and sodium have been detected, but at concentrations significantly below the maximum contamination levels (MCLs) set by the EPA. Beta particles (radionuclides) have also been detected in the well at levels below the MCLs. Total coliform bacteria have never been detected in Well #5.

This assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what ranking a source receives, protection is always important. Whether the source is currently located in a "pristine" area or an area with numerous industrial and/or agricultural land uses that require surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources. If the system should need to expand in the future, new well sites should be located in areas with as few potential sources of contamination as possible, and the site should be reserved and protected for this specific use.

For the City of Cottonwood, drinking water protection activities should first focus on correcting any deficiencies outlined in the sanitary survey (an inspection conducted every five years with the purpose of determining the physical condition of a water system's components and its capacity). Actions should be taken to keep a 50-foot radius perimeter clear of all potential contaminants from around the wellheads. Any contaminant spills within the delineation should be carefully monitored and dealt with. As much of the designated protection areas are outside the direct jurisdiction of the City of Cottonwood drinking water system, collaboration and partnerships with state and local agencies, and industry groups should be established and are critical to the success of drinking water protection. In addition, the wells should maintain sanitary standards regarding wellhead protection.

Due to the time involved with the movement of ground water, drinking water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. A strong public education program should be a primary focus on any drinking water protection plan as the delineation contains some urban and residential land uses. Public education topics could include proper lawn care practices, household hazardous waste disposal methods, and the importance of water conservation to name but a few. There are multiple resources available to help communities implement protection programs, including the Drinking Water Academy of the EPA. As there are transportation corridors through the delineation, the Idaho Department of Transportation should be involved in protection activities. Drinking water protection activities for agriculture should be coordinated with the Idaho State Department of Agriculture, the Soil Conservation Commission, the Clearwater Soil and Water Conservation District, and the Natural Resource Conservation Service.

A community must incorporate a variety of strategies in order to develop a comprehensive drinking water protection plan, be they regulatory in nature (e.g. zoning, permitting) or non-regulatory in nature (e.g. good housekeeping, public education, specific bet management practices). For assistance in developing protection strategies please contact the Lewiston Regional Office of the Idaho Department of Environmental Quality.

SOURCE WATER ASSESSMENT FOR WELL #5, CITY OF COTTONWOOD, IDAHO

Section 1. Introduction - Basis for Assessment

The following sections contain information necessary to understand how and why this assessment was conducted. **It is important to review this information to understand what the rankings of this assessment mean.** Maps showing the delineated source water assessment area and the inventory of significant potential sources of contamination identified within that area are attached. The list of significant potential contaminant source categories and their rankings used to develop the assessment is also included.

Background

Under the Safe Drinking Water Act Amendments of 1996, all states are required by the EPA to assess every source of public drinking water for its relative susceptibility to contaminants regulated by the Safe Drinking Water Act. This assessment is based on a land use inventory of the delineated assessment area and sensitivity factors associated with the wells and aquifer characteristics.

Level of Accuracy and Purpose of the Assessment

The Idaho Department of Environmental Quality (DEQ) is required by the EPA to assess the over 2,900 public drinking water sources in Idaho for their relative susceptibility to contaminants regulated by the Safe Drinking Water Act. This assessment is based on a land use inventory of the delineated assessment area, sensitivity factors associated with the wells, and aquifer characteristics. All assessments for sources active prior to 1999 were completed by May of 2003. SWAs for sources activated post-1999 are being developed on a case-by-case basis, DEQ is completing the Source Water Assessment for the City of Cottonwood Well #5 with this addendum. An in-depth, site-specific investigation of each significant potential source of contamination is not possible. **Therefore, this assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. The results should <u>not be</u> used as an absolute measure of risk and they should <u>not be</u> used to undermine public confidence in the water system.**

The ultimate goal of the assessment is to provide data to local communities to develop a protection strategy for their drinking water supply system DEQ recognizes that pollution prevention activities generally require less time and money to implement than treatment of a public water supply system once it has been contaminated. DEQ encourages communities to balance resource protection with economic growth and development. The local community, based on its own needs and limitations, should determine the decision as to the amount and types of information necessary to develop a drinking water protection program. Wellhead or drinking water protection is one facet of a comprehensive growth plan, and it can complement ongoing local planning efforts.

Section 2. Conducting the Assessment

General Description of the Source Water Quality

The City of Cottonwood drinking water system consists of four ground water wells currently serving 944 people through 440 connections. The City of Cottonwood resides in the Northwest portion of Idaho County along Hwy 95 (Figure 1).

There are no significant water problems currently affecting the Cottonwood Water Department's source water. The IOCs fluoride, barium, and nitrate have been detected, but at levels below the maximum contaminant levels (MCLs) as set by the EPA. No SOCs, VOCs, or microbial bacteria have been detected in tested well water.

Defining the Zones of Contribution – Delineation

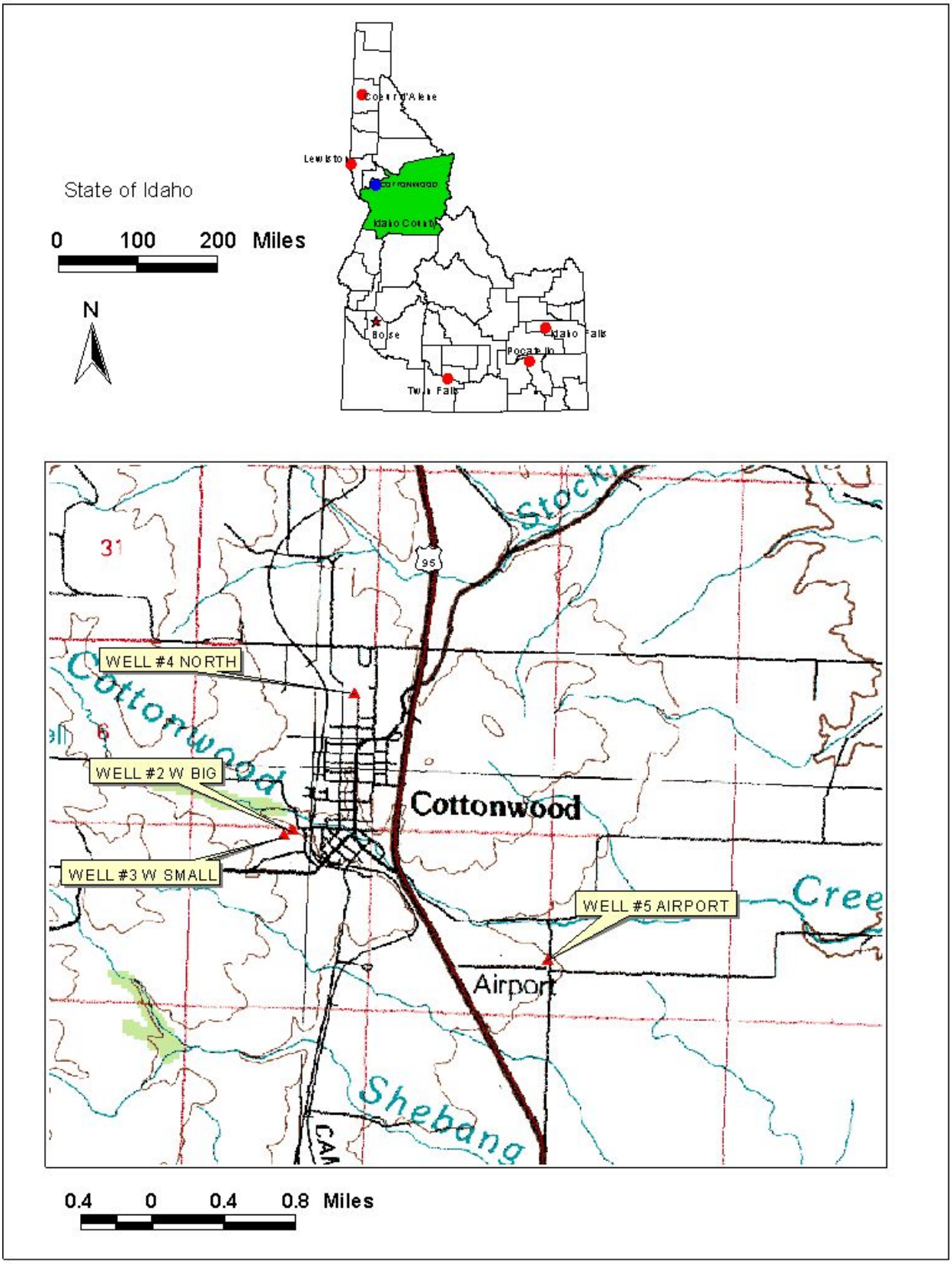
The delineation process establishes the physical area around a well that will become the focal point of the assessment. The process includes using a ground water model called WhAEM 2000. This model maps the boundaries of a "zone of contribution" or "capture zone" – the area of aquifer and everything above it from which the well draws its water – into three time of travel (TOT) zones (zones indicating the number of years necessary for a particle of water to reach a well). Zone 1B (0-3 years), Zone 2 (3-6 years), and Zone 3 (6-10 years) were used in this assessment. The computer model used site specific data, including the previous source water assessment work as well hydrologic reports (detailed below) to develop the capture zone.

The conceptual hydrogeologic model for the area is based on an interpretation of available well logs and published geologic maps. The City of Cottonwood is located along Hwy 95, 12 miles north of Grangeville. The Salmon River, the most notable surface water feature of the region, is located approximately 11 miles south of town (DEQ, 2002).

The region lies on the eastern edge of the Columbia River Plateau, a large flood basalt deposit extending from the study area to the Pacific Ocean. The Grande Ronde Formation is the most abundant formation of the Columbia River Basalt Group (CRBG) within the study area. The Imnaha, a formation stratigraphically below the Grande Ronde, is also present in the study area in small exposures. Intrusive granitoids associated with the Idaho Batholith and the Seven Devils volcanics form the basement complex for the region. The majority of the ground water in the region lies within the basalts of the Grande Ronde Formation and associated interbeds. The intrusive granitoids contain very little water and are considered impermeable. Water for this well occurs within the basalt flows.

The ground elevation at the well is about 3420 feet above mean sea level (MSL). Area elevations range from approximately 980 ft to 3000 ft above MSL. Discharge from Well #5 is 600 gallons per minute (gpm) with drawdown of 15-20 feet.

Figure 1. Geographic Location of Cottonwood Water Department



The recharge to the aquifer in this region is primarily due to precipitation. A recent model constructed on the Lewiston basin estimated recharge as 1 inch/year (Wyatt-Jaykim, 1994). Given the study area is higher in elevation than Lewiston and receives more precipitation, a higher recharge rate was used. The Lewiston area receives around 13 inches/year of precipitation, whereas the study area receives around 23 inches/year (Cohen and Ralston, 1980). Therefore, the recharge rate for this particular model was originally estimated at 2 inches/year.

Using the WhAEM 2000 model, the SWA delineation was determined based on the pre-existing modeling efforts for the other city wells (University of Idaho, 2001). The parameters for the simulations of the previous model were reviewed and used to create a new WhAEM model.

The capture zones delineated herein are based on limited data and must be taken as best estimates. If more data become available in the future the delineation should be adjusted based on additional new data.

The final delineated capture zone for Well #5 is a teardrop shaped area that extends to the southwest from the pumping well (Figure 2). The large normal fault running north-south through the study area, as described in Dale Ralston's work, restricts the areal extent of the capture zone to a narrow path near the 10-year time of travel boundary (Ralston, 2003). The actual data used by DEQ in determining the source water assessment delineation area is available upon request.

Identifying Potential Sources of Contamination

A potential source of contamination is defined as any facility or activity that stores, uses, or produces, as a product or by-product, the contaminants regulated under the Safe Drinking Water Act and has a sufficient likelihood of releasing such contaminants at levels that could pose a concern relative to drinking water sources. The goal of the inventory process is to locate and describe those facilities, land uses, and environmental conditions that are potential sources of ground water contamination. The locations of potential sources of contamination within the delineation areas were obtained by field surveys conducted by DEQ and from available databases.

Land use within the immediate area of the City of Cottonwood Well #5 is urban in the form of an airport and major transportation corridor, while the surrounding area is non-irrigated agriculture.

It is important to understand that a release may never occur from a potential source of contamination provided they are using best management practices. Many potential sources of contamination are regulated at the federal level, state level, or both to reduce the risk of release. Therefore, when a business, facility, or property is identified as a potential contaminant source, this should not be interpreted to mean that this business, facility, or property is in violation of any local, state, or federal environmental law or regulation. What it does mean is that the potential for contamination exists due to the nature of the business, industry, or operation. There are a number of methods that water systems can use to work cooperatively with potential sources of contamination, including educational visits and inspections of stored materials. Many owners of such facilities may not even be aware that they are located near a public water supply well.

Contaminant Source Inventory Process

A two-phased contaminant inventory of the study area was conducted in December 2003 and January 2004. The first phase involved identifying and documenting potential contaminant sources within the City of Cottonwood Well #5 source water assessment area (Figure 2) through the use of field surveys, computer databases and Geographic Information System (GIS) maps developed by DEQ. The second, or enhanced, phase of the contaminant inventory involved contacting the operator to identify and add any additional potential sources in the area.

The delineated source water assessment area of the City of Cottonwood Well #5 includes, but is not limited to: Hwy 95 a major transportation corridor, a small airport, an above Ground Storage Tank (AST), Cottonwood Sales Yard, agricultural land and a wastewater land application site. These potential sources could contribute leachable contaminants to the aquifer in the event of an accidental spill, release, or flood. Table 1 below lists the potential contaminants for the wells.

Table 1. City of Cottonwood Well #5, Potential Contaminant Inventory and Land Use

Site	Description of Source	TOT[1] Zone	Source of Information	Potential Contaminants[2]
1	Waste Water Land Application	0-3 YR	Database	IOC, Microbial
2	AST	0-3 YR	Database	IOC, VOC, SOC
	Highway 95	0-3 YR	GIS Map	IOC, VOC, SOC, Microbial
	Cottonwood Sales Yard	0-3 YR	GIS MAP	IOC, Microbial
	Airport	0-3 YR	GIS Map	IOC, VOC, SOC

[1] **TOT = time-of-travel (in years) for a potential contaminant to reach the wellhead**
[2] **IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical**

City of Cottonwood Delineation Map and Pontential Contaminant Source Locations

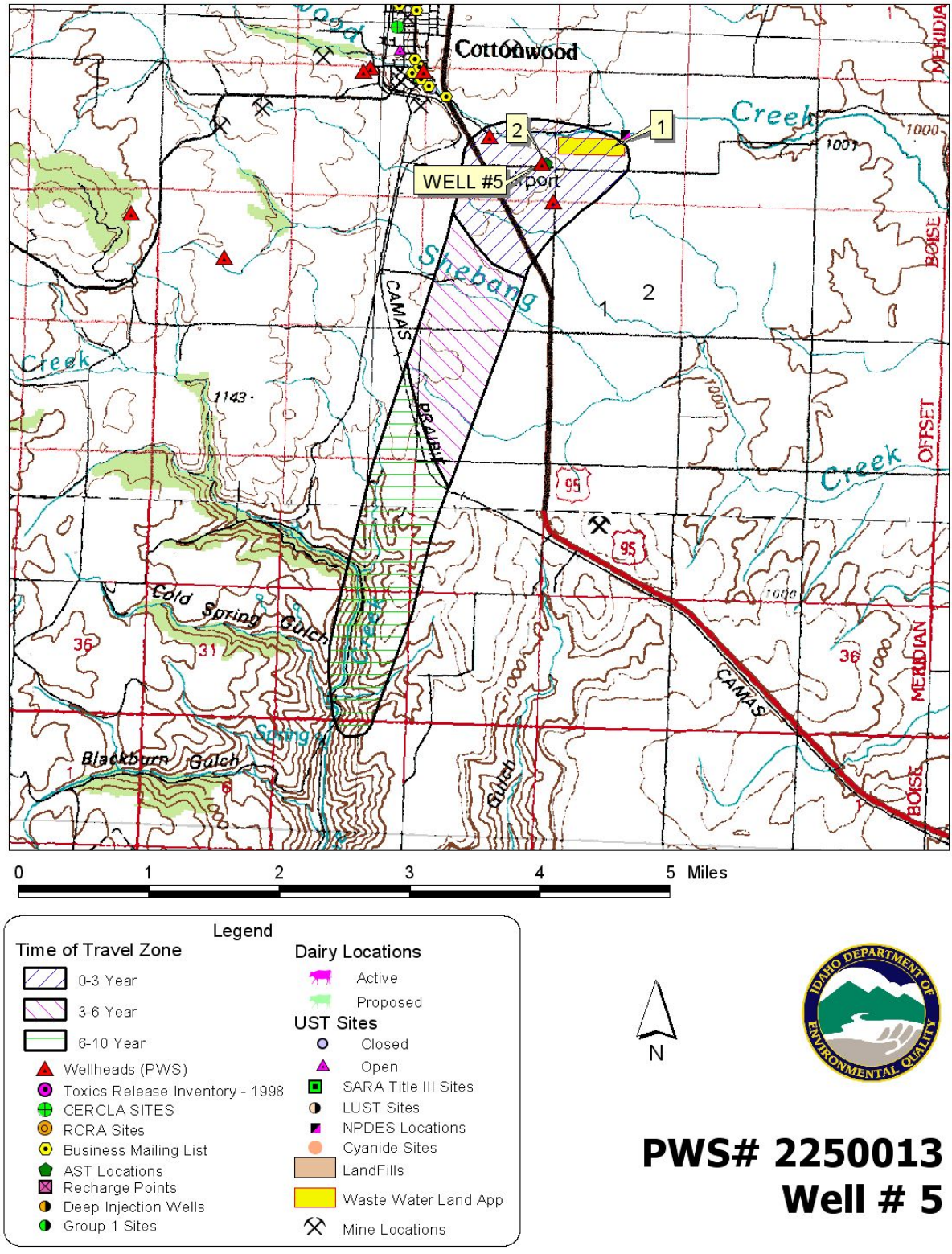


Figure 2. City of Cottonwood Well #5 Delineation Map and Potential Contaminate Source Locations

Section 3. Susceptibility Analyses

Each well's susceptibility to contamination was ranked as high, moderate, or low risk according to the following considerations: hydrologic characteristics, physical integrity of the well, land use characteristics, and potentially significant contaminant sources. The susceptibility rankings are specific to a particular potential contaminant or category of contaminants. Therefore, a high susceptibility rating relative to one potential contaminant does not mean that the water system is at the same risk for all other potential contaminants. The relative ranking that is derived for each well is a qualitative, screening-level step that, in many cases, uses generalized assumptions and best professional judgement. Appendix A contains the susceptibility analysis worksheet for the system. The following summaries describe the rationale for the susceptibility ranking.

Hydrologic Sensitivity

The hydrologic sensitivity of a well is dependent upon four factors: the surface soil composition, the material in the vadose zone (between the land surface and the water table), the depth to first ground water, and the presence of a 50-foot thick fine-grained zone (aquitard) above the producing zone of the well. Slowly draining soils such as silt and clay typically are more protective of ground water than coarse-grained soils such as sand and gravel. Similarly, fine-grained sediments in the subsurface and a water depth of more than 300 feet protect the ground water from contamination.

Hydrologic sensitivity rated moderate susceptibility for Well #5. According to the Natural Resource Conservation Service (NRCS), area soils are poorly to moderately drained, and the vadose zone is composed of basalt. The moderate rating was received, because, according to the well log, depth to ground water is less than 300 feet and aquitard is not present above the well's producing zone.

Well Construction

Well construction directly affects the ability of the well to protect the aquifer from contaminants. System construction scores are reduced when information shows that potential contaminants will have a more difficult time reaching the intake of the well. Lower scores imply a system is less vulnerable to contamination. For example, if the well casing and annular seal both extend into a low permeability unit, then the possibility of contamination is reduced and the system construction score goes down. If the highest production interval is more than 100 feet below the water table, then the system is considered to have better buffering capacity. If the wellhead and surface seal are maintained to standards, as outlined in sanitary surveys, then contamination down the well bore is less likely. If the well is protected from surface flooding and is outside the 100-year floodplain, then contamination from surface events is reduced. DEQ engineers approved Well #5 at the time of its construction in 2003.

Well #5 was drilled in 2003 to a depth of 813 feet below ground surface (bgs). A 16-inch diameter (0.375-inches thick) steel casing was set to 515 feet bgs into hard basalt. A "neat cement" seal was placed from the surface to 360 feet bgs into basalt. From 360 to 508 feet bgs a "native fill" was used. Neat cement is again used from 508 to 515 feet bgs. The open hole extends from 516 to 814 feet bgs. The static water level is found at 342 feet bgs (IDWR, 2003).

City of Cottonwood Well #5 rated low susceptibility for system construction. The well is located outside of a 100-year floodplain, its highest production comes from more than 100 feet below static water levels, and the casing and annular seal are seated into impermeable units. The rating reflects the fact that a sanitary survey has not been conducted on this system yet, so it is unknown if the wellhead and surface seal are maintained.

The Idaho Department of Water Resources *Well Construction Standards Rules* (1993) require all PWS's to follow DEQ standards as well. IDAPA 58.01.08.550 requires that PWS's follow the *Recommended Standards for Water Works* (1997) during construction. These standards include provisions for well screens, pumping tests, and casing thickness to name a few. Table 1 of the *Recommended Standards for Water Works* (1997) lists the required steel casing thickness for various diameter wells. In this case, City of Cottonwood Well #5 meets the IDWR requirements for well construction.

Potential Contaminant Source and Land Use

The well rated moderate susceptibility for IOCs (e.g. nitrates, arsenic), VOCs (e.g. petroleum products, chlorinated solvents), SOCs (e.g. pesticides), and microbial contaminants (e.g. bacteria). The limited number of potential contaminants and the agricultural land use in the 3-year TOT zone contributed to the moderate potential contaminant source/land use scores.

Final Susceptibility Ranking

An IOC detection above a drinking water standard MCL, any detection of a VOC or SOC, or a detection of total coliform bacteria or fecal coliform bacteria at the wellhead will automatically give a high susceptibility rating to a well despite the land use of the area because a pathway for contamination already exists. Additionally, if there is contaminant sources located within 50 feet of the source then the wellhead will automatically get a high susceptibility rating. Hydrologic sensitivity and system construction scores are heavily weighted in the final scores. Having multiple potential contaminant sources in the 0 to 3-year time of travel zone (Zone 1B) and agricultural land contribute greatly to the overall ranking. In this case, Well #5 rated moderate susceptibility to IOCs, VOCs, SOCs, and microbial contaminants.

Table 2. Summary of City of Cottonwood Susceptibility Evaluation

	Susceptibility Scores[1]									
	Hydrologic Sensitivity	Contaminant Inventory				System Construction	**Final Susceptibility Ranking**			
Well		IOC	VOC	SOC	Microbial		IOC	VOC	SOC	Microbial
Well #5	M	M	M	M	M	L	M	M	M	M

[1]H = High Susceptibility, M = Moderate Susceptibility, L = Low Susceptibility,
IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

Susceptibility Summary

The City of Cottonwood drinking water system consists of four ground water wells. The wells are situated within the City of Cottonwood along Hwy 95, 12 miles north of Grangeville. Well # 5, drilled in May of 2003 is located on the East Side of Hwy 95 from the City of Cottonwood, near the Airport. The City of Cottonwood's drinking water system currently serves 944 people through 440 connections (Figure 1).

In terms of total susceptibility, Well #5 of the City of Cottonwood rated moderate susceptibility for IOCs, VOCs, SOCs, and microbial contaminants. Hydrologic sensitivity rated moderate susceptibility and system construction low susceptibility. Land use is predominantly agricultural land in the 6-year and 10-year TOT zones, contributing to the overall susceptibility of the system.

Section 4. Options for Drinking Water Protection

The susceptibility assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what the susceptibility ranking a source receives, protection is always important. Whether the source is currently located in a "pristine" area or an area with numerous industrial and/or agricultural land uses that require surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources.

For the City of Cottonwood, drinking water protection activities should first focus on correcting any deficiencies outlined in the sanitary survey. Actions should be taken to keep a 50-foot radius perimeter clear of all potential contaminants from around the wellheads. Any contaminant spills within the delineation should be carefully monitored and dealt with. As much of the designated protection areas are outside the direct jurisdiction of the City of Cottonwood drinking water system, collaboration and partnerships with state and local agencies, and industry groups should be established and are critical to the success of drinking water protection. In addition, the wells should maintain sanitary standards regarding wellhead protection.

Due to the time involved with the movement of ground water, drinking water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. As there are many houses within the delineation, a strong public education program should be a primary focus of any drinking water protection plan. Public education topics could include proper lawn and garden care practices, hazardous waste disposal methods, proper care and maintenance of septic systems, and the importance of water conservation to name but a few. There are multiple resources available to help communities implement protection programs, including the Drinking Water Academy of the EPA. Drinking water protection activities for agriculture should be coordinated with the Idaho State Department of Agriculture, the Soil Conservation Commission, the Clearwater Soil and Water Conservation District, and the Natural Resource Conservation Service.

A system must incorporate a variety of strategies in order to develop a comprehensive drinking water protection plan, be they regulatory in nature (e.g. zoning, permitting) or non-regulatory in nature (e.g. good housekeeping, public education, specific best management practices). For assistance in developing protection strategies please contact the Lewiston Regional Office of the DEQ.

Assistance

Public water supplies and others may call the following DEQ offices with questions about this assessment and to request assistance with developing and implementing a local protection plan. In addition, draft protection plans may be submitted to the DEQ office for preliminary review and comments.

Lewiston Regional DEQ Office (208) 799-4370

State DEQ Office (208) 373-0502

Website: http://www.deq.state.id.us

POTENTIAL CONTAMINANT INVENTORY
LIST OF ACRONYMS AND DEFINITIONS

AST (Aboveground Storage Tanks) – Sites with aboveground storage tanks.

Business Mailing List – This list contains potential contaminant sites identified through a yellow pages database search of standard industry codes (SIC).

CERCLIS – This includes sites considered for listing under the **Comprehensive Environmental Response Compensation and Liability Act (CERCLA)**. CERCLA, more commonly known as Superfund is designed to clean up hazardous waste sites that are on the national priority list (NPL).

Cyanide Site – DEQ permitted and known historical sites/facilities using cyanide.

Dairy – Sites included in the primary contaminant source inventory represent those facilities regulated by Idaho State Department of Agriculture (ISDA) and may range from a few heads to several thousand head of milking cows.

Deep Injection Well – Injection wells regulated under the Idaho Department of Water Resources generally for the disposal of stormwater runoff or agricultural field drainage.

Enhanced Inventory – Enhanced inventory locations are potential contaminant source sites added by the water system. These can include new sites not captured during the primary contaminant inventory, or corrected locations for sites not properly located during the primary contaminant inventory. Enhanced inventory sites can also include miscellaneous sites added by the Idaho Department of Environmental Quality (DEQ) during the primary contaminant inventory.

Floodplain – This is a coverage of the 100year floodplains. Group 1 Sites – **These are sites that show elevated levels of contaminants and are not within the priority one areas.**

Inorganic Priority Area – Priority one areas where greater than 25% of the wells/springs show constituents higher than primary standards or other health standards.

Landfill – Areas of open and closed municipal and non-municipal landfills.

LUST (Leaking Underground Storage Tank) – Potential contaminant source sites associated with leaking underground storage tanks as regulated under RCRA.

Mines and Quarries – Mines and quarries permitted through the Idaho Department of Lands.)

Nitrate Priority Area – Area where greater than 25% of wells/springs show nitrate values above 5 mg/L.

NPDES (National Pollutant Discharge Elimination System) – Sites with NPDES permits. The Clean Water Act requires that any discharge of a pollutant to waters of the United States from a point source must be authorized by an NPDES permit.

Organic Priority Areas – These are any areas where greater than 25% of wells/springs show levels greater than 1% of the primary standard or other health standards.

Recharge Point – This includes active, proposed, and possible recharge sites on the Snake River Plain.

RICRIS – Site regulated under **Resource Conservation Recovery Act (RCRA)**. RCRA is commonly associated with the cradle to grave management approach for generation, storage, and disposal of hazardous wastes.

SARA Tier II (Superfund Amendments and Reauthorization Act Tier II Facilities) – These sites store certain types and amounts of hazardous materials and must be identified under the Community Right to Know Act.

Toxic Release Inventory (TRI) – The toxic release inventory list was developed as part of the Emergency Planning and Community Right to Know (Community Right to Know) Act passed in 1986. The Community Right to Know Act requires the reporting of any release of a chemical found on the TRI list.

UST (Underground Storage Tank) – Potential contaminant source sites associated with underground storage tanks regulated as regulated under RCRA.

Wastewater Land Applications Sites – These are areas where the land application of municipal or industrial wastewater is permitted by DEQ.

Wellheads – These are drinking water well locations regulated under the Safe Drinking Water Act. They are not treated as potential contaminant sources.

NOTE: Many of the potential contaminant sources were located using a geocoding program where mailing addresses are used to locate a facility. Field verification of potential contaminant sources is an important element of an enhanced inventory.

Where possible, a list of potential contaminant sites unable to be located with geocoding will be provided to water systems to determine if the potential contaminant sources are located within the source water assessment area.

References Cited

Cohen, P.L., and Ralston, D.R., 1980. Reconnaissance study of the "Russell" Basalt aquifer in the Lewiston Basin of Idaho and Washington, Research

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University of Idaho, 2001. Conceptual Model for the Cottonwood and Monastery of St. Gertrudes sources

Appendix A

City of Cottonwood
Susceptibility Analysis
Worksheet

The final scores for the susceptibility analysis were determined using the following formulas:

1) VOC/SOC/IOC Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.2)

2) Microbial Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.375)

Final Susceptibility Scoring:

0 - 5 Low Susceptibility

6 - 12 Moderate Susceptibility

≥ 13 High Susceptibility

Ground water Susceptibility Report	Cottonwood Water Department	Public Water System Number: ID2250013	Well #5 Airport	3/30/2004

1. System Construction		Score	
Drill Date	4/15/03		
Driller Log Available	Yes		
Sanitary Survey (if yes, indicate date of last survey)	Not yet performed on this well		
Well meets IDWR construction standards	Yes	0	
Wellhead and surface seal maintained	Unknown	1	
Casing and annular seal extend to low permeability unit	Yes	0	
Highest production 100 feet below static water level	Yes	0	
Well located outside the 100 year flood	Yes	0	
Total System Construction Score		1	Low

2. Hydrologic Sensitivity			
Soils are poorly to moderately drained	Yes	0	
Vadose zone composed of gravel, fractured rock or unknown	No	0	
Depth to first water > 300 feet	No	1	
Aquitard present with > 50 feet cumulative thickness	No	2	
Total Hydrologic Score		3	Moderate

3. Potential Contaminate/Land Use		IOC Score	VOC Score	SOC Score	Microbial Score
Zone 1A					
Land Use Zone 1A	Dryland Agricultural	1	1	1	1
Farm Chemical use	No	0	0	0	0
IOC, VOC, SOC or Microbial sources in zone 1A	No	0	0	0	0
Total Potential Contaminate Source/Land Use Score		1	1	1	1
Zone 1B					
Contaminant sources present (Number of Sources)	Yes	4	2	2	2
Score = # Contaminant Sources X 2 (8 Points Maximum)		8	4	4	4
Land use Zone I	>50% AG non-irrigated	2	2	2	2
Zone 1B contains or intercepts a Group 1 Area	No	0	0	0	
Sources of Class II or III leacheable contaminants (4 Points Maximum)	Yes	3	3	3	0
Total Potential Contaminate Source/Land Use Score		13	9	9	6
Zone II					
Contaminant sources present	No	0	0	0	0
Land use Zone II	>50% AG non-irrigated	1	1	1	0
Sources of Class II or III leacheable contaminants	No				
Total Potential Contaminate Source/Land Use Score		1	1	1	0
Zone III					
Contaminant sources present	No				
Is there Agricultural Land use that occupy >50% of zone	Yes	1	1	1	
Sources of Class II or III leacheable contaminants	Yes	1	0	0	
Total Potential Contaminate Source/Land Use Score		2	1	1	0
Cumulative Potential Contaminant/Land Use Score		17	12	12	7
		Moderate	*Moderate*	*Moderate*	*Moderate*
4. Final Susceptibility Use Score		7	6	6	7
5. Final Well Ranking		Moderate	Moderate	Moderate	Moderate